Self-operated Regulators Series 42

Differential Pressure Regulator with opening actuator and balanced Type 2422 Valve

Type 42-20 · Type 42-25

ANSI version

Application

For differential pressure set points (Δp) from **0.75** to **145 psi (0.05** to **10 bar)** · Valves sizes **NPS** ½ to **10** (**DN 15** to **250)** Pressure rating **Class 125** to **300** · Suitable for liquids and vapors from **40 °F** to **660 °F (5 °C** to **350 °C)**, air and other non-flammable gases up to **175 °F (80 °C)**

The valve **opens** when the differential pressure rises

Differential pressure regulators for large heating systems and industrial plants.

The differential pressure to be controlled is transmitted to the spring-loaded operating diaphragm in the actuator and converted into a positioning force to move the valve plug. The regulators control the differential pressure according to the adjusted set point.

Special features

- Low-noise, self-operated P-regulators requiring little maintenance
- Fixed set point (Type 24-20) or a set point adjustable over wide range (Type 24-25)
- Single-seated valve balanced by a stainless steel bellows
- Suitable for circuit water, water/glycol mixtures up to 30 %, steam and air as well as other liquids, gases and vapors, provided these do not affect the characteristics of the operating diaphragm
- Valve body optionally available in cast iron A 126 B, carbon steel A 216 WCC or cast stainless steel A 351 CF8M

Versions

Differential pressure regulators for installation in a bypass pipe or short-circuit pipe (see Typical application)

Type 42-20 (Fig. 1) · With Type 2422 Valve for NPS ½ to 4 (DN 15 to 100) · Type 2420 Opening Actuator with fixed set point, adjusted to Δp = 3, 4, 6 or 7 psi (0.2, 0.3, 0.4 or 0.5 bar)

Type 42-25 (Fig. 2) · With Type 2422 Valve for NPS ½ to 10 (DN 15 to 250) · Type 2425 Opening Actuator with adjustable set point in the range between 0.75 and 145 psi (0.05 to 10 bar)

Special versions

Actuator with two diaphragms · Actuator with FPM diaphragm for oils · Special K_{VS} (reduced) · Valve entirely made of corrosion-resistant material (minimum grade 1.4301) · Valves larger than NPS 10 (DN 250) · Backflow prevention (refer to T 3009 EN) · Version for deionized water · For temperatures above 430 °F (220 °C) · Version free of non-ferrous metal

Fig. 1 · Type 42-20 Differential Pressure Regulator

Fig. 2 · Type 42-25 Differential Pressure Regulator

Accessories

Refer to the Data Sheet T 3095 EN for any required accessories, e.g. compression-type fittings, needle valves, equalizing tanks and control lines.

Principle of operation (Fig. 3)

The medium flows through the valve in the direction indicated by the arrow. The position of the valve plug (3) determines the differential pressure across the free area between the plug (3) and the seat (2).

The valve is fully balanced. The upstream pressure acts on the outer surface of the metal bellows (5) and the downstream pressure on the inside of the bellows. In this way, the forces acting on the valve plug created by the upstream and downstream pressures are balanced out.

The differential pressure to be controlled is transmitted to the operating diaphragm (12) where it is converted into a positioning force. This force moves the plug (3) according to the force of the set point springs.

In Type 42-25, the set point can be adjusted at the set point adjustment (17).

In Type 42-20, the set point springs (14) in the actuator determine the set point.

The control lines in all versions transmit the low pressure and high pressure to the actuator.

SAMSON offers a special version of the regulator with an actuator with two diaphragms, which is especially suitable for applications with thin oils (e.g. heat transfer oil).

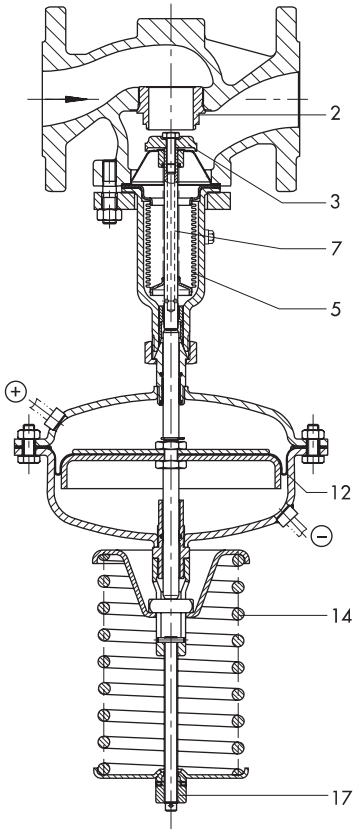
Type 42-25 Differential Pressure Regulator with an actuator with two diaphragms

The regulator with an actuator with two diaphragms provides increased functional safety.

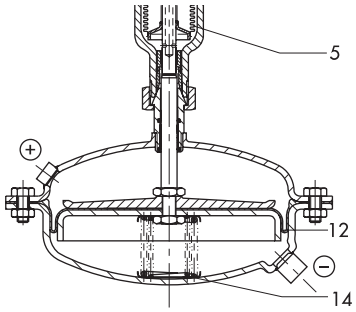
The operating diaphragm for the high pressure is connected to the valve inlet pressure and the operating diaphragm for the low pressure is connected to the valve outlet pressure. A bore hole located in the intermediate ring between the two diaphragms is fitted with a mechanical diaphragm rupture indicator (22), which responds at approx. 22 psi (1.5 bar). In the event of a diaphragm rupture, the pressure in the space between the two operating diaphragm starts to increase. This causes the pin in the diaphragm rupture indicator to be pushed outwards and a red ring appears, indicating the fault. The remaining operating diaphragm takes on the control task of the ruptured diaphragm.

An alarm can be triggered by attaching an optional pressure switch.

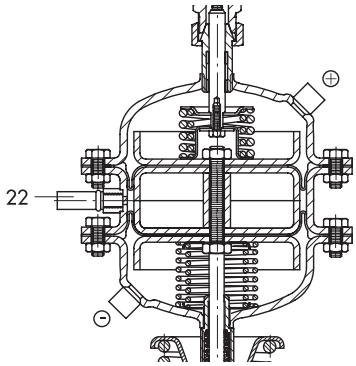
We recommend replacing both operating diaphragms when a rupture has been indicated.



Type 42-25 Differential Pressure Regulator
with Type 2425 Actuator



Type 42-20 Differential Pressure Regulator
with Type 2420 Actuator



Type 42-25 Differential Pressure Regulator,
actuator with two diaphragms

2 Seat
3 Plug
5 Balancing bellows made of CrNiMo steel
7 Plug stem
12 Operating diaphragm
14 Set point spring
17 Set point adjustment
22 Diaphragm rupture indicator

Fig. 3 · Sectional drawings

Table 1 · Technical data

Type		**42-20**		**42-25**			
Nominal size		**NPS ½ to 4 · DN 15 to 100**		**NPS ½ to 10 · DN 15 to 250**			
Pressure rating		Class 125, 150 and 300					
Max. permissible temperature	Body	See pressure-temperature diagram					
	Actuator [1]	With equalizing tank: Steam and liquids up to 660 °F (350 °C) Without equalizing tank: Liquids up to 300 °F (150 °C) · Air and gases up to 175 °F (80 °C)					
Set point ranges	psi	3 · 4 · 6 or 7		0.75 to 3.5 · 1.5 to 8.5 · 3 to 15 · 7 to 20 15 to 35 · 30 to 75 · 65 to 145			
	bar	0.2 · 0.3 · 0.4 or 0.5		0.05 to 0.25 · 0.1 to 0.6 · 0.2 to 1 · 0.5 to 1.5 1 to 2.5 · 2 to 5 · 4.5 to 10			
Diaphragm area A		25 in² (160 cm²)	50 in² (320 cm²)	12 in² (80 cm²)	25 in² (160 cm²)	50 in² (320 cm²)	100 in² (640 cm²)
Max. permissible operating pressure for actuator with two diaphragms		–		290 psi (20 bar)	175 psi (12 bar)	145 psi (10 bar)	90 psi (6 bar)
Leakage rate		≤ 0.05 % of C_V (K_{VS})					

[1] Higher temperatures available on request

Terms for valve sizing according to DIN EN 60534, Parts 2-1 and 2-2: $F_L = 0.95$; $x_T = 0.75$
Refer to Dimensions and weights for assignment of valve and actuator

Refer to Data Sheet T 2650 EN for more details on the version of **Type 2422** Valve **balanced by a diaphragm**

Table 2 · Materials · Material number acc. to ASTM and DIN EN

Type 2422 Valve			
Pressure rating	Class 125	Class 150	Class 150/300
Valve body	Cast iron A 126 B	Carbon steel A 216 WCC	Cast stainless steel A 351 CF8M
Seat and plug	1.4006 or 1.4104		1.4571
Plug stem	Stainless steel 1.4301		
Metal bellows	Stainless steel 1.4571 · NPS 6 and larger: 1.4404		
Lower part of body	P265GH		1.4571
Body gasket	Graphite on metal core		
Type 2420 and Type 2425 Actuator			
Diaphragm cases	Sheet steel DD11		1.4301
Diaphragm	EPDM with fabric reinforcement [1]		

[1] Special version for oils (ASTM I, II, III): FPM (FKM)

Table 3 · Permissible C_V (K_{VS}) coefficients, z values and maximum permissible differential pressures

Nominal size		**NPS**	**½**	**¾**	**1**	**1½**	**2**	**2½**	**3**	**4**	**6**	**8**	**10**
		DN	**15**	**20**	**25**	**40**	**50**	**65**	**80**	**100**	**150**	**200**	**250**
Seat diameter			0.9″ (22 mm)			1.6″ (40 mm)		2.6″ (65 mm)		3.5″ (89 mm)	6″ (125 mm)	8.1″ (207 mm)	
Travel			0.4″ (10 mm)					0.6″ (16 mm)			0.9″ (22 mm)		
C_V (K_{VS}) coefficient	Normal	C_V	5	7.5	9.4	23	37	60	94	145	330	490	590
		K_{VS}	4	6.3	8	20	32	50	80	125	280	420	500
	Reduced	C_V	1.2	3	5	9.4	20	32	37	60	245	370	440
		K_{VS}	1	2.5	4	8	16	20	32	50	210	315	375
z value			0.65	0.6	0.55	0.45	0.4				0.35	0.3	
Max. permissible differential pressure Δp			360 psi (25 bar)					290 psi (20 bar)		230 psi (16 bar)	175 psi (12 bar)	145 psi (10 bar)	

Installation

The valve and actuator are delivered in separate packaging.

The actuator can be easily mounted before or after the valve is installed using a coupling nut.

The following points need to be observed:

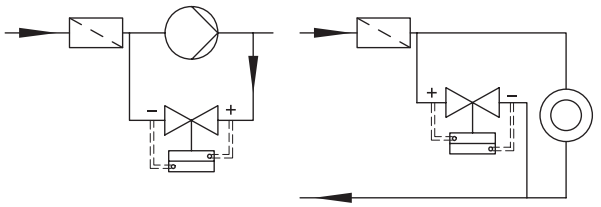
- Install valves in horizontal pipelines.
- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- Install a strainer upstream of the valve (e.g. SAMSON Type 2 NI).

Permissible mounting positions

- All nominal sizes: Install the actuator suspended downwards (see photo)
- NPS ½ to 3 (DN 15 to 80)/Up to 250 °F (120 °C): Install the actuator either suspended or upright
- All nominal sizes with fixed plug guide/up to 250 °F (120 °C): Any position possible
- Steam applications: Always install actuator suspended downwards

Further details can be found in EB 3007 EN.

Typical application



= = = = To be attached on installing the regulator in the pipeline

Fig. 4 · Typical application

Pressure-temperature diagram – ASTM materials –

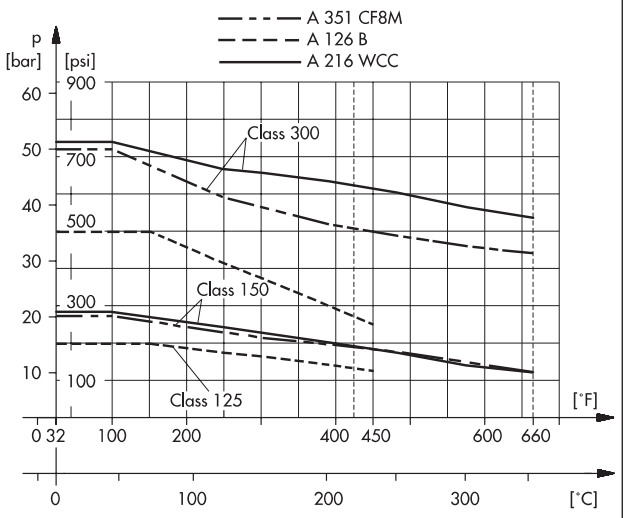
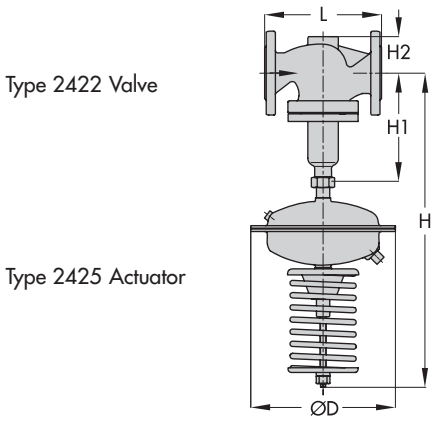
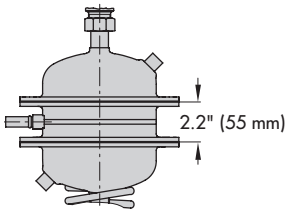


Fig. 6 · Pressure-temperature diagram

Dimensions – refer to Table 4 –



Type 42-25



Special version

Type 42-25 with actuator with two diaphragms

Add approx. 2.2″ (55 mm) to height H

Fig. 5 · Dimensional drawing of Type 42-25

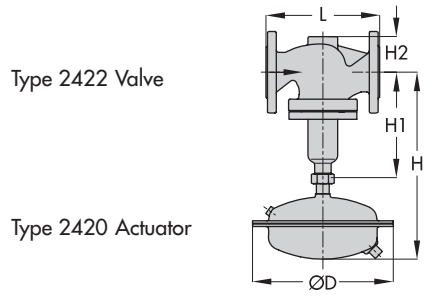
Table 4 · Dimensions and weights for Type 42-25

Nominal size		NPS	½	¾	1	1½	2	2½	3	4	6	8	10
		DN	15	20	25	40	50	65	80	100	150	200	250
Length L	Cl 125/ Cl 150	inch	7.25			8.75	10	10.9	11.75	13.9	17.75	21.4	26.5
		mm	184			222	254	276	298	352	451	543	673
	Cl 300	inch	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	18.6	22.4	27.9
		mm	191	194	197	235	267	292	318	368	473	568	708
Height H1		inch	8.9					11.8		14	23.2	28.7	
		mm	225					300		355	590	730	
Height H2		inch	1.8			2.8		3.9		4.5	6.9	9.25	10.2
		mm	45			72		98		113	175	235	260
Type 42-25 Differential Pressure Regulator													
Set points	**Type 2425 Actuator**												
0.75 to **3.5 psi** (0.05 to 0.25 bar)	Height H		24.6″ (625 mm)					27.6″ (700 mm)		29.7″ (755 mm)	44.1″ (1120 mm)	49.6″ (1260 mm)	
	Actuator		Ø D = 11.2″ (285 mm), A = 50 in² (320 cm²) [2]										
	Weight [1]	lb	46	47	49.5	65	70.5	110.5	112.5	143	408	937	1069
		kg	21	21.5	22.5	29.5	32	46	51	65	185	425	485
1.5 to **8.5 psi** (0.1 to 0.6 bar)	Height H		24.6″ (625 mm)					27.6″ (700 mm)		29.7″ (755 mm)	44.1″ (1120 mm)	49.6″ (1260 mm)	
	Actuator		Ø D = 8.9″ (225 mm), A = 25 in² (160 cm²) [3]					Ø D = 11.2″ (285 mm), A = 50 in² (320 cm²)			Ø D = 15.4″ (390 mm), A = 100 in² (640 cm²) [3]		
	Weight [1]	lb	35.3	36.3	38.5	54	59.5	110.5	112.5	143	408	937	1069
		kg	16	16.5	17.5	24.5	27	46	51	65	185	425	485
3 to **15 psi** (0.2 to 1 bar)	Height H		24.6″ (625 mm)					27.6″ (700 mm)		29.7″ (755 mm)	44.1″ (1120 mm)	49.6″ (1260 mm)	
	Actuator		Ø D = 8.9″ (225 mm), A = 25 in² (160 cm²) [3]								Ø D = 15.4″ (390 mm), A = 100 in² (640 cm²)		
	Weight [1]	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	408	937	1069
		kg	16	16.5	17.5	24.5	27	42	47	61	185	425	485
7 to **20 psi** (0.5 to 1.5 bar)	Height H		24.6″ (625 mm)					27.6″ (700 mm)		29.7″ (755 mm)	42.1″ (1070 mm)	47.6″ (1210 mm)	
	Actuator		Ø D = 8.9″ (225 mm), A = 25 in² (160 cm²) [3]								Ø D = 15.4″ (390 mm), A = 50 in² (320 cm²)		
	Weight [1]	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	386	915	1047
		kg	16	16.5	17.5	24.5	27	42	47	61	175	415	475
15 to **35 psi** (1 to 2.5 bar)	Height H		24.6″ (625 mm)					27.6″ (700 mm)		29.7″ (755 mm)	42.1″ (1070 mm)	47.6″ (1210 mm)	
	Actuator		Ø D = 8.9″ (225 mm), A = 25 in² (160 cm²)										
	Weight [1]	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	386	915	1047
		kg	16	16.5	17.5	24.5	27	42	47	61	175	415	475
30 to **75 psi** (2 to 5 bar)	Height H		24.6″ (625 mm)					27.6″ (700 mm)		29.7″ (755 mm)	42.1″ (1070 mm)	47.6″ (1210 mm)	
	Actuator		Ø D = 6.7″ (170 mm), A = 12 in² (80 cm²)								Ø D = 8.9″ (225 mm), A = 25 in² (160 cm²)		
	Weight [1]	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	375	904	1036
		kg	16	16.5	17.5	24.5	27	42	47	61	170	410	470
65 to **145 psi** (4.5 to 10 bar)	Height H		24.6″ (625 mm)					27.6″ (700 mm)		29.7″ (755 mm)	On request		
	Actuator		Ø D = 6.7″ (170 mm), A = 12 in² (80 cm²)										
	Weight [1]	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5			
		kg	16	16.5	17.5	24.5	27	42	47	61			

[1] The weight applies to the version with material specifications A 126 B. Add 10 % for versions in other materials · [2] Optionally with actuator A = 100 in² (640 cm²)
[3] Optionally with actuator A = 50 in² (320 cm²) · [4] Optionally with actuator A = 25 in² (160 cm²)

Type 24-25 with actuator **with two diaphragms**: Add approx. **2.2″ (55 mm)** to height **H**

Dimensions – refer to Table 5 –



Type 42-20

Fig. 7 · Dimensional drawing of Type 42-20

Table 5 · Dimensions and weights for Type 42-20

Nominal size		**NPS**	½	¾	1	1½	2	2½	3	4	
		DN	**15**	**20**	**25**	**40**	**50**	**65**	**80**	**100**	
Length L	Cl 125/ Cl 150	inch	7.25			8.75	10	10.9	11.75	13.9	–
		mm	184			222	254	276	298	352	
	Cl 300	inch	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	
		mm	191	194	197	235	267	292	318	368	
Height H1		inch	8.9					11.8		14	
		mm	225					300		355	
Height H2		inch	1.8			2.8		3.9		4.5	
		mm	45			72		98		113	
Type 42-20 Differential Pressure Regulator											
Set points	**Type 2420 Actuator**										
3, 4, 6, 7 psi (0.2, 0.3, 0.4, 0.5 bar)	Height H		15.4" (390 mm)					18.3" (465 mm)		20.5" (520 mm)	–
	Actuator		Ø D = 8.9" (225 mm), A = 25 in² (160 cm²) [2]					Ø D = 11.2" (285 mm), A = 50 in² (320 cm²)			
	Weight [1]	lb	46	47	49.5	65	70.5	110.5	112.5	143	
		kg	11.5	12	13	20	22.5	38	43	57	

[1] The weight applies to the version with material specifications A 126 B. Add 10 % for versions in other materials · Optionally with actuator A = 50 in² (320 cm²)

Ordering text

Differential Pressure Regulator **Type 42-20/42-25**
NPS … (DN ...)
Body material ..., Class ...
Set point / set point range ... psi (bar)
On option, accessories … (refer to T 3095 EN)
On option, special version …

Specifications subject to change without notice.

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